attitude, and largely accounts also for the perpetual success of those whose business it is to defy the section and to maintain their "unworked" patents to the detriment of the British industry.

JUSTIN E. POLLAK.

London, March 4.

Measurements of Medieval English Femora.

PROF. KARL PEARSON'S criticisms are always welcome and stimulating to those strong enough to bear them though, since they are usually of the destructive variety, the fear of them undoubtedly prevents a good deal of work which would add to our knowledge being published. Let me deal, for instance, with the following criticism. "Looking at Dr. Parsons's results I can but conclude that his sexing is based on a fallacy, and the dip he has created in the Rothwell femora between those with 45 and 47 mm. heads—the range of Dwight's doubtful sex—is due to conscious or unconscious selection of his material; out of the great masses of bones available at Rothwell (which should have occupied in measurement of many characters and in their adequate reduction the whole time of a man for four or five years)."

By "conscious selection of material" I can scarcely think that deliberate fraud is suggested—I do not indeed know what it really means; while unconscious selection I suppose is covered by inaccurate measurements or by the absence of bones of a certain size which ought, mathematically, to be there.

At any rate, the impression conveyed by the stricture is that, from an enormous available mass of material, I have deliberately or unfortunately picked out a small selection which would bear out some object which I wished to prove

It is almost inconceivable that Prof. Karl Pearson would have mentioned the "great masses of bones available" unless he really knew what he was talking about, so that we may safely assume that he has been to Rothwell and satisfied himself on this point.

I can only say that I have spent a great deal of time at Rothwell, and that I found considerable difficulty in picking out 300 measurable femurs, and this was particularly the case with the slighter bones which, owing to the damp, snapped like carrots when touched.

I can assure Prof. Pearson that every measurable bone which could be extricated was welcome, and none were rejected because their sizes did not suit.

As to four years of a man's whole time being needed for the research, I can only infer that Prof. Pearson thinks that there is unlimited measurable material at Rothwell, and that, if I could not give the time he thinks necessary, I had better have left it to some other man who could. These really are the words of the "mere mathematician" ignoring all practical details. Did not Prof. Pearson observe when he went to Rothwell that the bones were rotting with damp—exactly the opposite condition, by the bye, to his Naquada bones—and that the farther he worked into the stack, for he must have done this or how would he otherwise have known about the "great masses of bones available"? the more sodden and useless the material became? As no one else showed the least sign of spending even four weeks in working at the Rothwell bones, I did what I could while I could, for if I had left it for another ten years the available material would have been much less. Incidentally, I advised the restacking of the heaps, so that air now gets among the bones, and they will not disintegrate so rapidly. There is another practical point, too, about which Prof. Pearson is silent; it is the fact that the ordinary anatomist has difficulty in getting unlimited measurements recorded, and my contribution of sixteen sets of measurements on nearly 300 bones was all I could fairly expect our journal to print for me at one time.

In other points I think that Prof. Pearson and I are in practical agreement. We agree that neither of us can sex femurs with accuracy (I find that in eighty-two attempts I made seven mistakes), but that, when we have sexed them to our individual taste, the average difference in results is a fraction of a millimetre. We both agree that the head measurement alone is often liable to mislead, and that a series of secondary sexual tests of graded value are needed. These I have attempted to provide in a paper which will appear shortly, and of which I will not fail to send Prof. Pearson a copy.

Above all, I am glad to see that he tacitly agrees with me about the Rothwell bones being medieval, probably of the fourteenth and adjacent centuries.

F. G. PARSONS.

St. Thomas's Hospital, S.E.

The Green Flash.

PROF. PORTER'S interesting letter (NATURE, February 18, p. 672) on this subject must be my excuse for sending a summary of my own experience during the last eighteen years in which I have observed the flash more than a hundred times, and in no single case did I find anything not explainable by atmospheric dispersion, nor anything that could be put down as a subjective or complementary after-image.

I may add that I have observed with the naked eye, with an opera-glass (power 3), with binoculars (power 9), and with a telescope (power 100).

Whenever on a clear day a low sun is observed through a telescope, the upper limb appears bordered with a marine, *i.e.*, blue-green, fringe, the lower with an orange-red fringe, the side-limbs are unaltered. (The telescope should have a solar diagonal and other means of reducing the brightness of the sun.)

The marine upper fringe develops ultimately into the green flash, the blue element weakening as the sun descends. I have watched this change with the telescope, and it is perfectly continuous.

Again, if the sun descends behind a low cloud, parallel to the horizon, but with a clear space between, the base of the sun, just as it becomes visible, shows the red flash. I have seen this only thrice, as the necessary conditions are obviously seldom satisfied. The red flash seems inexplicable save by dispersion.

Under favourable conditions at sunset, as the upper segment of a yellow sun gradually diminishes, the right and left corners of the segment become green; this colour gradually spreads inwards, becoming marine, until finally the last tip of the sun may appear almost greenish-blue, and just as the sun has sunk, a very faint wisp of blue light is glimpsed directly above the point of disappearance. One friend even records a violet wisp.

But when the sun is orange the blue is replaced by green, and when the sun is really red no green flash at all is seen, the atmosphere cutting off the green as well as the blue rays. To see these changes it is desirable to use a power of 8 or 9.

Prof. Barnard, writing to me some years ago, said he preferred the title, "blue flash," as in sunsets seen over the Pacific from the Lick Observatory the final flash was usually blue. Doubtless this is due to clear atmosphere.

It is well known that at sunrise, when no exciting colour can be present, the flash has been seen, sometimes green, sometimes blue.

In the 1906 volume of *Symons's Meteorological*

©1915 Nature Publishing Group

Magazine appears correspondence on this subject by Dr. Rambaut, myself, and others, and the editor, Dr. Mill, in summing up the matter, decided strongly in favour of the dispersion theory. Capt. Carpenter, R.N., whose numerous observations appear in the *British Astron. Assoc. Journal,* holds the same view.

It is quite true that, if I look steadily at a bright red sun, and then close my eyes, I see a green after-image, but this is just what the observer of the green flash should not do. He should avoid looking at the sun when it is bright, and should wait until it is so low that the eye can easily bear the light—should wait, in fact, until only a very small segment is visible. As before stated, with a really red sun the flash fails to appear, so far as my experience goes. If proper precautions are taken I do not think any appreciable after-image will be present.

I may point out that the nature of the horizon, provided it is clean-cut and low down, makes but little difference. It may be of cloud, land, or water, and, of course, the last is the best. My experience relates to all three.

But few persons appear to have used a telescope for observing the flash. If those who have not done so would observe a low sun with a power of, say, 100, I think that they would be convinced that the true cause was atmospheric dispersion.

The real mystery about the flash is that it so often fails to appear, when apparently all conditions seem favourable. I have not yet found any explanation of this, but I am inclined to the opinion that at a clear sunset the flash could always be seen if a telescope were available, though it might be too feeble for the naked eye, for a telescope invariably reveals the upper green fringe when the sun is low. The telescope, of course, was achromatic, and showed no colour with a high sun. To the Journal of the B.A.A., to that of the Leeds Astron. Society, and to the *English Mechanic* I have contributed very numerous notes on this subject, but references to them would occupy too much of your valuable space. C. T. WHITMELL.

Invermay, Hyde Park, Leeds, February 22.

The Prices of Chemicals.

I HAVE had the same experience as "S. P." Since my letter of February 18 I have been able to purchase dulcite at 60*s.* an ounce from a firm of dealers in chemicals other than the one to which I referred. I cannot admit, therefore, that my complaint was unjustifiable. J. J.

University of Liverpool, March 2.

THROUGH SIBERIA.[1]

THIS book is the diary of a very interesting journey accomplished by the author in the course of the autumn of 1913. In fact, it describes four different journeys: one from Tromsö, *via* the Kara Sea, to the mouth of the Yenisei; then up the Yenisei to Krasnoyársk; next by rail across Transbaikalia and Manchuria to Vladivostók on the Pacific; and from this port to Petrográd, by the Usuri and the new Amur railway and the main Trans-Siberian line. A remarkable feature of this journey, during which more than 16,000 miles were covered, is that it was accomplished in less than three months, from August 5, when the party started from Tromsö, to October 27, when Dr. Nansen reached Petrográd.

We cannot expect to find detailed descriptions of the different portions of the immense continent thus rapidly crossed; but the book throughout has the greatest interest, owing to the human element it contains, and the unexpected glimpses it gives of the Canada of the East, with its wonderful development during the last fifteen years. In addition, it is illustrated by more than 160 beautiful photographs, taken by the author himself, most of which are worth pages of descriptions. The ethnographical remarks about the northern natives, whose encampments, or boats, Dr. Nansen always found time to visit, especially about the remaining members of that curious, once numerous, nation, the Yenisei Ostyáks, will be read with a special interest; while the photographs, as may be seen from the two accompanying specimens, give a clear idea of the ethnographical types of the different native tribes.

The really difficult part of the journey, from Tromsö to the mouth of the Yenisei, was made on the steamer *Correct,* with the experienced pilot Capt. Johannsen, without meeting with serious difficulties. There was a good deal of ice in the Kara Strait, and especially further east, so that the *Correct* had to enter the Kara Bay in order to follow the narrow, more or less ice-free channel close to the coast of the Yalmal peninsula. There was only one dangerous accident, when the steamer stuck on a mud bank close by the Devil's Island; but otherwise the journey was quite successful, and it took only eighteen days from the day the steamer entered the Kara Strait to the day it reached the port at Nosónovskiye Islands, in the Yenisei, under the 71st degree of latitude.

Once more the practicability of the northern route to Siberia was thus demonstrated. But it must be said that the conditions of ice along the northern coast of Siberia show great variations in different years, and in 1913 they certainly were by far not so favourable as they were in the years 1870–1871 and 1875–1878. A very valuable appendix, where the average summer temperatures on the shores of the Kara Sea and the conditions of ice in that sea are given for the last forty-one years, shows that while this passage was remarkably free from ice in the years named, as well as in 1890, 1897, 1900, 1901, and 1904, the conditions were not favourable for navigation in 1883, 1884, 1888, 1911, and 1913, unfavourable in 1895 and 1902, and most unfavourable in 1903 and 1912.

Still, Dr. Nansen is certain that the northern route may become a regular line of traffic if certain measures are taken. During his journey up the Yenisei, and later on along the Trans-Siberian railway, he had full opportunities to discuss such measures with M. Vostrótin, a Russian merchant and member of the Duma who has great knowledge of the Siberian north, and also made the journey on the *Correct,* and

---

[1] "Through Siberia, the Land of the Future." By Dr. F. Nansen. Translated by A. G. Chater. Pp. xvi+478. (London: W. Heinemann 1914.) Price 15*s*, net.

©1915 Nature Publishing Group